What is claimed is:

1. A multiple-pole electric machine comprising a rotor and a stator, wherein the rotor is of p-m, of electric excitation, or of induction; the number of poles is 8 or more; armature winding is formed by solid wires and is arranged into layers in a slot to form a wave winding with an equal or unequal pitch; and each turn of said winding in the slot contacts the wall of the iron core of the stator.

2. The multiple-pole electric machine as claimed as Claim 1, wherein said armature winding is a wave winding without being lapped at the extension.

3. The multiple-pole electric machine as claimed as Claim 1, wherein said armature winding is a wave winding being partially lapped at the extension.

4. The multiple-pole electric machine as claimed as Claim 1, wherein said armature winding is a pole-pitch wave winding.

5. The multiple-pole electric machine as claimed as Claim 1, or 2, or 3 or 4, wherein said armature winding is located in the slot with a single strand of the wires in each layer and both two sides of the wires contact the wall of the iron core.

6. The multiple-pole electric machine as claimed as Claim 1, 2, 3, or 4, wherein said armature winding is located in the slot with double-strand of the wires in each layer and one of the left side and the right side of the wires contacts the wall of the iron core.

7. The multiple-pole electric machine as claimed as Claim 2, wherein each pole has m slots; a phase winding is resulted by m windings on each layer; and said m windings are arranged to cross m adjacent slots in the same direction and not being lapped at the extension; the different phase windings can be obtained by translating said m windings on different layers.

8. The multiple-pole electric machine as claimed as Claim 3, wherein said number of slots belonging to each pole of the iron core is $m \times k$, where m is the number of phase and k is the number of slot occupied by one phase belt; each phase winding comprises k windings; said k windings are arranged to cross k slots from one extension in the same direction, to cross one pole span without being lapped at the other extension, and to come back to the original extension from another k slots

where they are not lapped; and all m phase windings on each layer may be obtained by translating said phase winding comprising k windings by $n \times k$ slots, where n is an integer.

9. The multiple-pole electric machine as claimed as Claim 4, wherein each pole comprises m slots; m phase windings are formed on each layer by m windings and are overlapped each other at the extension; and each phase winding is formed by a pole-pitch wave winding.

10. The multiple-pole electric machine as claimed as Claim 1, wherein said rotor is of electric exciting; the slot of the iron core are straight; each pole occupies one slot; and said winding is a pole-pitch wave winding winded by a single strand or a double-strand of solid wires and is not lapped at the extension.

11. The multiple-pole electric machine as claimed as Claim 1, wherein there is an inclination g between the p-m pole of the rotor and the tooth slot of the stator, and the length of the iron core L is met: $L \times tg(g) \leq 2T$, where T is the tooth pitch, g is an inclined angle.

12. A multiple-pole electric machine comprising a rotor and stator, wherein the number of poles is 8 or more; the iron core of the stator includes no slots; and the armature winding is a surface wave winding with an equal or unequal pitch and is arranged on the surface of the winding in a single layer.

13. The multiple-pole electric machine as claimed as Claim 12, wherein said armature winding is a surface wave winding without being lapped at the extension, and comprises k strands of wires in a single phase winding, wherein said k strands of wires are arranged side by side in the same vertical direction to transversely cross the surface of the iron core from the lower extension to the upper extension without being lapped with each other, and to come back to the lower extension from crossing vertically the surface of the iron core after passing through a pole span at the upper extension, without being lapped; and said k strands of wires are arranged side by side on the surface into a single layer and occupies a width of a phase belt of a phase winding.

14. The multiple-pole electric machine as claimed as Claim 12, wherein said armature winding is a surface wave winding being partially lapped, and has m phase

windings, each of which is a surface wave winding comprising k strands of wires without being lapped at the extension; and said m phase windings are obtained by translating said surface wave winding with k strands of wires and are lapped each other at the extension.

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15. A method for pulse exciting of a p-m generator having 8 poles or more, comprising the following steps of:

a. setting one or more phase windings on the armature as exciting windings, each exciting winding comprising an exciting circuit for charging and discharging; and

b. setting a trigger circuit for discharging in said circuit for discharging so that a trigger take places within 30° before and after said windings are exactly facing a pole.

16. The method for pulse exciting of a p-m generator as claimed in Claim 15, wherein said exciting circuit for charging and discharging comprises a capacitor for charging and discharging to perform a process of charging and discharging in a electric cycle, wherein the direction of discharging is that of enhancing the pole; said circuit for charging comprises a rectification circuit and a current-limiting resistance; and said circuit for discharging comprises a switch and a trigger circuit thereof.

17. The method for pulse exciting of a p-m generator as claimed in Claim 16, wherein said trigger circuit of said switch comprises a position sensor for testing a pole position or a tester for testing a phase voltage, to obtain the information of the time of the pole coming and to produce a trigger signal for discharging.